



Tanta University
Faculty of engineering
Electrical Power and Machines engineering department
Principles of Energy Conversion Course



Sheet (2) D.C. Motors

- 1) A 4 pole, lap wound, D.C. motor has 540 conductors. Its speed is found to be 1000 r.p.m. when it is made to run light. The flux per pole is 25 mWb. It is connected to 230 V D.C. supply. The armature resistance is 0.8Ω . Calculate:
i) Induced e.m.f. ii) Armature current iii) Stray losses iv) Lost torque
- 2) A d.c. shunt motor runs at a speed of 1000 r.p.m. on no load taking a current of 6 A from the supply, when connected to 220 V d.c. supply. Its full load current is 50 A. Calculate its speed on full-load. Assume $R_a = 0.3 \Omega$ and $R_{sh} = 110 \Omega$.
- 3) A d.c. series motor is running with a speed of 800 r.p.m. while taking a current of 20 A from the supply. If the load is changed such that the current drawn by the motor is increased to 50 A, calculate the speed of the motor on new load. The armature and series field winding resistances are 0.2Ω and 0.3Ω respectively. Assume the flux produced is proportional to the current. Assume supply voltage as 250 V.
- 4) A 250 V d.c. shunt motor has a shunt field resistance of 200Ω and an armature resistance of 0.3Ω . For a given load, motor runs at 1500 r.p.m. drawing a current of 22 A from the supply. If a resistance of 150Ω is added in series with the field winding, find the new armature current and the speed. Assume load torque constant and magnetization curve to be linear.
- 5) A d.c. series motor runs at 500 r.p.m. on 220 V supply drawing a current of 50 A. the total resistance of the machine is 0.15Ω , calculate the value of the extra resistance to be connected in series with the motor circuit that will reduce the speed to 300 r.p.m. The load torque being half of the previous value. Assume flux proportional to the current.
- 6) A 500 V d.c. shunt motor runs at its normal speed of 250 r.p.m. when the armature current is 200 A. The armature resistance is 0.12Ω . Calculate the speed when a resistance is inserted in the field reducing the shunt field current to 80% of the normal value and the armature current is 100 A.

Best wishes
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